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Publication Trail and Update Rules

The Electronic News Journals (ENJ) are a medium for exchange of scientific information and debate. In particular, they serve as the forum where articles received by the ETAI (Electronic Transactions on Artificial Intelligence) are discussed publicly for review, in separate News Journals for each ETAI area.

The Electronic News Journal on Reasoning about Actions and Change (ENRAC), in particular, uses a publication trail where contributed information is first distributed on a daily basis as *Newsletters* using electronic mail and web pages in HTML. Then, contributions during the same month are compiled into an HTML version of the monthly *News Journal*. Finally, the same information is converted via Latex to a postscript version that is suitable for printing on paper and reading off-line. It is formally published and archived by the Linköping University Electronic Press in both its electronic and its paper form, as described on page (iv).

Offprints of individual segments. Each News Journal issue consists of a sequence of *segments* relating to specific topics. "Offprints" of these can be obtained from the URL:s indicated at the head of the first page of each segment, or from the ENRAC service page specified below. It is intended to maintain these URL:s and their contents for the foreseeable future. Misprints of minor significance are corrected in these offprints (but not in the E-Press version since it is considered archival).

Corresponding HTML edition with dynamic links. The HTML edition contains considerable numbers of links to other pages and structures on the net: articles that are available on-line, home pages of conferences and of individual researchers, links to other part of the ETAI structure, and so on. Due to the natural limitations of the paper medium, only some of the WWW links have been retained here as footnotes. In order to retrieve articles and other information that are referenced in the present issue, it is recommended to look up the corresponding issue in HTML and to use its link. The HTML issues of the News Journals on Reasoning about Actions and Change can be found at the ENRAC *service page,*

`http://www.etaij.org/rac/nj/`

It is intended that the HTML issues will by updated continously to the largest extent possible, for example by replacing URL links to the home pages of authors that have changed to another site.

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Dates of Publication

Since the date of publication may be understood either as the date of first public appearance, or as the day of reproduction on paper in many copies, and since both of these definitions may be difficult to apply in the case of electronic publication, we make the following clarifying statement.

The contents of the present issue were put on-line in their original, versions as Newsletters in plaintext, HTML, and latex/postscript during the month of May - June, 1999. Then the contents were edited and formatted, resulting in the present, formatted version which was published on 16.7.1999, in two concurrent editions: an on-line edition and a paper edition. The on-line edition was timestamped electronically and put on-line by Linköping University Electronic Press at the URL specified on page (i). The paper edition was obtained by printing the on-line edition on a standard computer printer. It was reproduced in 25 copies, legally archived, and made available for distribution.

Vol. 3: *67-67*, 30.6.1999
http://www.etaij.org/rac/nj/9905/

The Months of May - June

Summary of News Journals Contents

The months of May and June saw the contribution of two articles: Camilla Schwind's research article "Causality in Action Theories", and Murray Shanahan's reference article "The Event Calculus Revisited". The refereeing of several articles (both regular research articles and reference articles) was also concluded during the present two-month period.

In June, exactly one year after the call for contributions of reference articles, we advertised a new initiative, the *Logic Modelling Workshop*, with the explicit goal of facilitating research that contributes concrete, high-quality axiomatizations of classes of real-world phenomena. The Logic Modelling Workhop, LMW, uses a two-dimensional structure with a set of logics of actions and change (represented by accepted reference articles) on one axis, and a set of scenario worlds and stories within them on the other axis. Contributions to the LMW will take the form of technical notes that are usually to be published in the present News Journal, and which are also added to the LMW's webpage structure. A note later on in the present issue explains in more detail how this will work.

The establishment of the Logic Modelling Workshop is one more example of how the ETAI is not merely a conventional journal gone electronic. It is our goal to facilitate new modes of research communication that become possible through the availability of Internet-based services. In doing so, we may even contribute to changes in research methodology in our field.

Vol. 3: *68-70*, 30.6.1999
http://www.etaij.org/ra/rac/008/

Protocol of on-line discussion during May - June, 1999
about the following research article:

David Poole

Decision Theory, the Situation Calculus and Conditional Plans

Q4. **Anonymous Referee 1** (12.6.1999)

Review form

1. Are the results of the article, as specified in the summary, of significant interest for researchers in our area?

The themes considered in the paper are of great interest.

2. Does the full text substantiate the claims made in the summary?

There are many claims, many lacking precision and clarity. The paper delivers on some of them (see below).

3. Is the text intelligible and concise?

The main ideas in the paper are intelligible, but the presentation is often confusing (see below).

4. Do you know of any previous publication of the same result?

No.

5. Are there any other considerations that may affect the decision?

No.

More detailed comments

Based on my understanding, the best way to describe the paper is as proposing a way of representing actions, probabilities, utilities, sensors, and conditional plans in logic programs where:

- actions are represented using a situation calculus formulation close to Reiter's
- probabilities are represented by treating certain atoms in special way: the truth of certain combinations of atoms (choices) is set externally, not by the logic program
- utilities are represented by a "utility" predicate, defined in the logic program
- sensors are defined by a "sensing" predicate, defined in the logic program
- conditional plans are defined following the ideas of Levesque but are interpreted using the "sensing" predicate, rather than "knowledge" fluents

Once a logic program is defined along these lines and certain conditions hold, the expected utility of conditional plans is well defined. There are also hints about how to compute this expected utities by building suitable "explanations", by this is not explained in detail.

This would be good enough. The main problem is that the author does not see and does not present the paper in this way.

He sees the logic program in which the truth of certain combinations of atoms is defined externally as an "independent choice logic", a logic that is "based on Bayesian decision theory". He also says that the paper proposes "a new model; not an alternative to POMDPs, Bayesian Networks, logic programs, and the standard situation calculus, but a way to combine them", etc.

I think this is quite confusing.

Personally, I'd also prefer less general discussion about decision theory, logic, uncertainty, etc; and more details on the procedure for evaluating the expected utilities of plans and its performance over some examples.

Q5. **Anonymous Referee 2** (12.6.1999)

Answers to the Refereeing Questions

1. Are the results of the article, as specified in the summary, of significant interest for researchers in our area?

Yes, definitely.

2. Does the full text substantiate the claims made in the summary?

Yes, fully.

3. Is the text intelligible and concise?

Intelligible: yes. Concise: yes and no; see below.

4. Do you know of any previous publication of the same result?

No.

5. Are there any other considerations that may affect the decision?

None.

General remark. The article is lucid, well written, and easy to understand. It is relatively long (40 pages), but this is necessary for covering the topic it sets out for: to propose an integration of the author's "independent choice logic" with a variety of Toronto situation calculus, including background, definitions, examples, and comparisons with other approaches. Everyone may not agree with the approach, but it is a valuable contribution.

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Vol. 3: *71-73*, 30.6.1999
http://www.etaij.org/ra/rac/011/

Protocol of on-line discussion during May - June, 1999
about the following research article:

Chitta Baral and Son Cao Tran

Relating Theories of Actions and Reactive Control

Q2. **Anonymous Referee 1** (18.5.1999)

1. Are the results of the article, as specified in the summary, of significant interest for researchers in our area?

Yes.

2. Does the full text substantiate the claims made in the summary?

Yes.

3. Is the text intelligible and concise?

Yes. (Additional comments concerning minor corrections are being given to the authors).

4. Do you know of any previous publication of the same result?

No.

5. Are there any other considerations that may affect the decision?

No.

Q3. **Anonymous Referee 2** (18.5.1999)

This paper concerns an important topic, namely the connection between action theories and control. The paper is correct and well-written and I think that the paper should be accepted. However, I have one objection to make.

If we instead of "action theory" use the term "open-loop specification" and instead of "reactive control" use "control law" the results of the paper concern the topic of verification and synthesis of control laws w.r.t. to some specification. In this sense the results are not at all original, since these research problems have generated an abundance of work in Control Theory (more precisely, in work on "Discrete Event Dynamic Systems", DEDS). The authors appear to be completely unaware of this work and on a number of points they re-invent the wheel (e.g. the criterion for "correctness of maintenance control modules" corresponds exactly to a particular flavour of stability criteria, see [3]). There is not one single reference to the DEDS (or Hybrid Systems) literature in the bibliography.

In other words, I observe that a large body of work in a similar problem area is neglected, in particular since it is is based on similar definitions and concepts (that is, verification and synthesis of control laws from specifications). It would have been an even better paper if a comparison to this work had been included.

On the other hand, the *usage* of these definitions and concepts is done in an original way by the authors. The main issues addressed by this paper have not (to the best of my knowledge) been studied by the DEDS or Hybrid Systems communities, for example modeling and control with sensing actions and conditional plans.

It is important to incorporate the achievements in Reasoning about Action and Change with control, but I think that it would be unfortunate if achievements in Control Theory are neglected while doing so.

Examples from the literature of control law synthesis and verification for discrete and hybrid systems can be found in [1, 2, 5], and various definitions of stability in [3, 4].

References

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[3] Ozveren, Willsky and Antsaklis, Stability and Stabilizability of Discrete Event Dynamic Systems, Journal of the ACM, 1991

[4] Passino and Burgess, Stability analysis of discrete event systems, John Wiley, 1998.

[5] Zhang and Macworth, Synthesis of hybrid constraint-based controllers, LNCS 999, 1995.

A3. **The Authors** (12.6.1999)

The comments of the anonymous reviewers were very useful. We would like to especially thank the second reviewer for pointing us towards the discrete event dynamic system (DEDS) literature and the similarity between our notion of maintainance and the notion of stability there.

We have now modified our paper by discussing this similarity and adding a few references to the literature in DEDS.

Chitta and Son

The authors have provided a summary of the changes, which is available from the paper's review discussion webpage.

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Vol. 3: *74-74*, 30.6.1999
http://www.etaij.org/ra/rac/018/

Camilla Schwind:

Causality in Action Theories

Abstract of the article

Causal reasoning has become very important in the last few years in logic based action theories. In this article, we study how causal inference has been integrated and used in action theories. After presenting and discussing criteria considered as the most meaningful, we present four formalisms which are approaches to actions and causality and we try to situate each formalism in relation to the criteria.

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http://www.etaij.org/ra/rac/018/

Camilla Schwind:

Causality in Action Theories

Summary of the article

Causal reasoning has become very important in the last few years in logic based action theories. In this article, we study how causal inference has been integrated and used in action theories.

We discuss criteria representing properties which might be desirable for causal implication, such as reasoning by case, to give an example. But there are also criteria representing properties which causal implication should not have. The criteria are discussed independently on the language level on which causal implication (or the causality relation) is represented.

We present four formalisms which are approaches to actions and causality and we try to situate each formalism in relation to the criteria.

Criteria for causality

We will try to situate each formalism in relation to the following criteria, considered as meaningful for causality.

1. Monotonicity
   Classical implication " $\rightarrow$" is monotonic. This means that from $\phi \rightarrow \psi$, we can conclude $\phi \wedge \chi \rightarrow \psi$. But the same is not so obvious for causal implication. To give an example:
   If it rains, then John will get wet clothes. If it rains and John has an umbrella, he will *not* get wet clothes. So, we have

   rain CAUSES *wet* but not necessarily *rain*$\wedge$*umbrella* CAUSES *wet*

2. Transitivity
   The classical implication is transitive. This means that from $\phi \rightarrow \psi$ and $\psi \rightarrow \chi$, we conclude $\phi \rightarrow \chi$. Arguments can be found for supporting both, that causality is transitive or that it is not transitive.

3. Contraposition

   Classical implication is contrapositive. This means that from $\phi \rightarrow \psi$ is true, we can conclude that $\neg\psi \rightarrow \neg\phi$ is true. Causality is certainly *not* contrapositive, as illustrates the following example.
   "If the sun is shining, I will go to the beach" might be true. But it is possible that I do not go to the beach, however the sun is shining. Hence the contraposition "if I do not go to the beach, then the sun is not shining" might not be true!!

4. Reflexivity
   Classical implication is reflexive, we have that $\phi \rightarrow \phi$ is true for any ϕ. But causality should not be reflexive. Nothing can cause itself!

5. Conjunction of preconditions
   For classical implication, if $\phi \wedge \pi \rightarrow \psi$ is true, then either $\phi \rightarrow \psi$ or $\pi \rightarrow \psi$ is true. This does not hold for causal implication as shows the following example:
   If I am in the bain tub and I use the hair dryer, this causes a danger for my life. But neither one of these facts alone causes a danger for my life. If somebody is in his bain tub, normally there is no danger for his life, neither if he uses a hair dryer.

   The following are properties which a causality relation should have.

6. Conjunction
   Just as for implication, if a fact causes two other facts, it should cause their conjunction. Thus we should have

   $$if\ \phi\ \text{ CAUSES }\ \psi\ \text{ and } \phi\ \text{ CAUSES }\ \pi \text{ then }\ \phi\ \text{ CAUSES } \psi \wedge \pi$$

7. Reasoning by case
   A causal relation should allow for reasoning by case. We think $\phi \vee \pi$ CAUSES ψ should be true, whenever ϕ CAUSES ψ and π CAUSES ψ are true.

   For an example, if John's right arm is broken, he cannot work any more. If John's left arm is broken, he cannot work neither. We know that either his left or his right arm is broken and we want to conclude that he cannot work any more.

8. Right weakening RW
   We think that a formula should cause all logical consequences of the formulas it causes, i.e. if ϕ CAUSES ψ and $\models \phi \rightarrow \chi$, then ϕ CAUSES χ. This is a specific form of the well known rule RCK which holds for all systems of conditional logic. This rule holds also for cumulative and preferential logics and has been used (and called "right weakening") by Sarit Kraus, Daniel Lehmann and Menachem Magidor in [4, 5].

9. Left logical equivalence LLE
   Classically equivalent assertions should have the same causal consequences. This is the well known rule RCEA of conditional logic. A more special form of this rule has been used (and called "left logical equivalence") for cumulative and preferential logics [4, 5].

   If ϕ CAUSES ψ and $\models \phi \leftrightarrow \chi$ then χ CAUSES ψ.

Approaches to Actions and Causality

We will discuss in greater detail four approaches.

1. Fangzen Lin in [7, 8] presents a theory for actions and causality which is based on classical predicate logic with circumscription. The causality relation $f\ CAUSES\ g$ is represented by a formula $Holds(f, s) \rightarrow caused(g, v, s)$, meaning "if f is true in the situation s, then g is caused to be v, where $v \in \{true, false\}$, in the situation s.
2. Norman McCain and Hudson Turner in [9, 10], represent causality by means of a conditional type operator $\Rightarrow$. $\phi\ CAUSES\ \psi$ is represented by a formula $\phi \Rightarrow \psi$. A special semantics is defined for specifying what are the consequences of a set of causal rules of this form. Lifschitz in [6] generalizes this notion of causality (for first-order formulas ϕ and ψ. One extension opf the action description language $\mathcal{A}$ [2] is based on this theory.
3. Michael Thielscher in [11] uses causal rules of the form $l\ CAUSES\ l'\ if\ \bigwedge_i l_i$, where l, l' and l_i are literals. These rules are generated automatically from clauses by means of *influence information.*
4. Laura Giordano, Alberto Martelli and Camilla Schwind in [1] use a unary modal operator © for expressing that a formula is caused. ϕ CAUSES ψ is expressed by $\phi \rightarrow$ ©ψ, meaning "if ϕ holds, then ψ is caused".

Resuming tableau

The following table resumes the results of study. We expect that the five first properties do not hold for causal implication whereas the four last properties should hold.

Criteria	Lin	MT cons	MT $\Rightarrow$	Thiel	GMS
Monotonicity	yes	no	yes	-	yes
Transitivity	yes	yes	yes	no	no
Contraposition	no	yes	no	no	no
Reflexivity	no	-	no	no	no
Conj. of prec.	yes	-	no	-	yes
AND	yes	yes	yes	-	yes
OR	yes	-	yes	-	yes
RW	-	yes	yes	-	yes
LLE	yes	-	yes	-	yes

MT cons stands for McCain and Turner's consequence relation, Thiel for Thielscher's and GMS for Giordano, Martelli and Schwind. We filled in "yes" whenever the respective theory admits the property and "no" if not. In the cases where the property is not expressible, we put -. It is worth observing that we did not meet any ideal theory admitting all the properties we thought it should and not admitting non one of those it should not.

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Electronic News Journal on Reasoning about Actions and Change 79
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http://www.etaij.org/ra/rac/014/

Protocol of on-line discussion during May - June, 1999
about the following reference article:

Patrick Doherty, Joakim Gustafsson, Lars Karlsson, and Jonas Kvarnström

TAL: Temporal Action Logics Language Specification and Tutorial

Q1. **Anonymous Referee 1** (12.6.1999)

1. *Does the article represent a tradition or "approach" where there is already a sufficient volume of work in the field?*

Yes.

2. *Does the article concisely specify the assumptions, motivations, and notations used in that approach? Does it correctly capture the assumptions, etc. that have been used and are being used?*

Yes. Note, however, that these notations etc. are fairly complex.

3. *Would reading the present article enable one to skip the introductory definitions section of many previously published articles that used the approach?*

Yes. However, the length of the article (32 pages) makes it unlikely that the same text would ever have been included as a part of another article.

4. *Is the article also concise in the sense that it does not contain a lot of material that is unnecessary for the above criteria?*

One would hope that it is sometimes possible to make do with a shorter introduction to the approach than this one. An article giving a full account of the approach couldn't have been much shorter, however.

5. *Is the article pedagogical and sufficiently easy to read, but at the same time precise and correct?*

Yes.

Q2. **Anonymous Referee 2** (12.6.1999)

I suggest to accept the article. Here is how I feel it conforms to the various criteria for reference articles:

1. *Does the article represent a tradition or "approach" where there is already a sufficient volume of work in the field?*

Yes, as is also shown in the article. Moreover it is a very active approach, with a rapidly growing volume of work.

2. *Does the article concisely specify the assumptions, motivations, and notations used in that approach? Does it correctly capture the assumptions, etc. that have been used and are being used?*

Yes concerning assumptions and notations. The article gives a very clear specification of TAL and in addition a nice "user manual". Motivations for the types of language statements and an explanation how the logics deal with the frame/qualification/ramification problems could be more elaborate: in this respect the article relies heavily on e.g. "Features and Fluents". However, I suppose it is acceptable for the article to rely on what the authors call its companion article (reference [29], on Cognitive Robotics Logic, by Erik Sandewall).

3. *Would reading the present article enable one to skip the introductory definitions section of many previously published articles that used the approach?*

Yes, under the same assumption as above.

4. *Is the article also concise in the sense that it does not contain a lot of material that is unnecessary for the above criteria?*

Yes.

5. *Is the article pedagogical and sufficiently easy to read, but at the same time precise and correct?*

Yes.

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http://www.etaij.org/ra/rac/015/

Protocol of on-line discussion during May - June, 1999
about the following reference article:

Michael Gelfond and Vladimir Lifschitz

Action Languages

Q1. **Anonymous Referee 1** (6.5.1999)

I have checked the article against the refereeing criteria for reference articles:

1. *Does the article represent a tradition or "approach" where there is already a sufficient volume of work in the field?*

Yes. The article describes a family of six action languages: the action description languages A, B, and C and the action query languages P, Q, and R, related by various subsumption relationships. The common semantics for these is defined using transition systems. This structure of languages looks a bit forbidding at first, but it is systematic and easy to grasp.

Some other action languages that have been introduced previously in time (such as $\mathcal{AR}_0$ and $\mathcal{AR}$) are not covered in this article. An explanation of how they relate to the languages described here would be helpful.

2. *Does the article concisely specify the assumptions, motivations, and notations used in that approach? Does it correctly capture the assumptions, etc. that have been used and are being used?*

Yes.

3. *Would reading the present article enable one to skip the introductory definitions section of many previously published articles that used the approach?*

Yes. (Note however that some journal articles also contain a general introduction to the 'frame problem' in reasoning about actions, and the present article does not provide that background).

4. *Is the article also concise in the sense that it does not contain a lot of material that is unnecessary for the above criteria?*

Yes.

5. *Is the article pedagogical and sufficiently easy to read, but at the same time precise and correct?*

Yes.

Q2. **Anonymous Referee 2** (6.5.1999)

The article is both concise and easy to read, and satisfies the requirements that have been set for reference articles. I recommend that it shall be accepted for publication.

I do have a question to the authors however. When they introduced action languages in 1993 (in the article in the Journal of Logic Programming), they proposed to "describe" a particular methodology for representing action as a translation from the action language to a "target language", in particular logic programming language. The formal results in many of the following papers have often concerned properties of a translation of an action language into circumscribied situation calculus (for example, the KR 1994 paper and the AI Journal 1997 paper), although of course the semantics of the action language has always been defined using transition systems.

The present article does not however contain any reference to such translations. Does this indicate that translations are no longer considered an essential part of the approach, or is it just the result of factoring out the formal definitions of the language in terms of syntax and semantics, omitting other aspects?

Electronic News Journal on Reasoning about Actions and Change
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http://www.etaij.org/ra/rac/016/

Protocol of on-line discussion during May - June, 1999
about the following reference article:

Erik Sandewall

Cognitive Robotics Logic and its Metatheory: Features and Fluents Revisited

Q1. **Anonymous Referee 1** (12.6.1999)

I have checked the article against the refereeing criteria for reference articles:

1. *Does the article represent a tradition or "approach" where there is already a sufficient volume of work in the field?*

Yes. The article well summarizes research that has been done by Sandewall and his group over the last ten years.

2. *Does the article concisely specify the assumptions, motivations, and notations used in that approach? Does it correctly capture the assumptions, etc. that have been used and are being used?*

Yes. Though clear from the context, I would clearly state the meaning of the predicate $D([s,t],s)$ used at page 8.

3. *Would reading the present article enable one to skip the introductory definitions section of many previously published articles that used the approach?*

Yes.

4. *Is the article also concise in the sense that it does not contain a lot of material that is unnecessary for the above criteria?*

Yes.

5. *Is the article pedagogical and sufficiently easy to read, but at the same time precise and correct?*

Yes.

Q2. **Anonymous Referee 2** (12.6.1999)

The paper is certainly acceptable as a reference article for the features and fluents approach, and meets all the relevant criteria.

I think it could be improved with the addition of a few examples. In particular, I think it would be an easier to read if a couple of examples of action laws were introduced, for standard benchmark scenarios. In fact, I don't think the form of an action law is ever defined.

It's a shame about the plethora of different ways of writing the same thing. This is quite confusing for the reader.

Electronic News Journal on Reasoning about Actions and Change
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http://www.etaij.org/ra/rac/017/

Protocol of on-line discussion during May - June, 1999
about the following reference article:

Hector Levesque, Fiora Pirri, and Ray Reiter

Foundations for the Situation Calculus

Q5. **Anonymous Referee 1** (5.5)

Recommendation: Accept.

(*This report was written before the open discussion about the article had started. The stated date refers to when the report was made public.*)

I find the article to be very well written and quite interesting. Particularly interesting is the section on Metatheory for the situation calculus which provides a better theoretical understanding of the logical language.

In general I think that the article fits its purpose. Namely, to provide a common standard for the general KR audience to the approach based on the situation calculus for the specification of action theories.

I find that the article, however, has an important shortcoming. The article is self centered, focusing only on the work of the authors. There is a great deal of work based on the situation calculus that is not touched upon in the article. The authors might argue that this body of work is not well established to be considered part of the foundations of the language. I refer to the work on causality, narratives, and other contributions by many authors (McIlraith, Miller, Shanahan, Pinto, Lin, etc.). I don't believe that the authors should extend their article to incorporate a detailed discussion of this work. However, the article should provide pointers for the research related to the situation calculus, and mention its relevance. For example, with regards to causality, it should state what the problem and intended solutions are and point to the right references.

Q6. **Anonymous Referee 2** (5.5)

This article should be accepted. It covers a major (possibly the largest single approach to reasoning about action) area, is written by the very best qualified people, and is technically accurate. This is not to say that it could not be improved.

I hope the following points help improve the article.

Sadly this paper does not really meet the refereeing criteria for reference articles. I believe that, in some ways, previous articles, or the article that the first part of the paper is taken from, provide better reference sources.

While the article definitely represents a tradition - the Toronto School - it does not meet fully three of the other four conditions. Namely, it does not capture the assumptions, motivations, and notations used in the Toronto School, it would not always enable one to skip the introductory definitions in other papers, and it is not pedagogical, or at least not to the standard of some of the authors other papers, rather it is full of detailed technical points, without explanations or intuition.

The article consists of two sections, the first is a cut down version of an article to appear in another journal. The theorems stated in the paper are proved in the article under review by another journal, proofs are omitted from the reference article, (as one would expect).

The first section of the paper is less an introduction to the tradition, than the particular definitions needed for a very technical paper. In particular, no general motivations or assumptions are specified. For instance, the paper deals mainly with *basic action theories*. These are introduced by the two sentences, "Our concern here is with axiomatizations for actions and their effect that have a particular syntactic form. These are called *basic action theories*, and we next describe these." This is insufficient introduction.

A definition of uniform formulas follows. Here I digress as this bears on another weakness of the paper.

The original terminology for uniform (in Reiter's The frame problem in the situation calculus) was *simple*. McIlraith continues to use simple as late as 1997. In G. De Giacomo, R. Reiter and M. Soutchanski. Execution monitoring of high-level robot programs, the phrase "whose only situation term is s" is used instead. (This is an error, as bound occurrences of s are not allowed in general.) I mention this only as an example of how the paper introduces new terminology, without relating it to the original terminology, or explaining in any way why we should care about this definition, e.g. why it is correct, but "whose only situation term is s" is not.

The rest of section 4 is other definitions, save for four paragraphs, a restatement of the definition of *uniform*, an example of an action precondition axiom, a comment on early work, and the claim that the consistency property is sufficient.

None of these provide any idea of why this tradition arose. Effect axioms are never mentioned. Neither are frame axioms. No reasons why basic action theories are useful, might arise in practice, are a good subset to study, or are amenable to study are given.

This should be compared with Reiter's paper, "The frame problem in the situation calculus", which essentially covers the same ground, but introduces effect axioms, frame axioms, the completeness assumption for preconditions, the explanation closure assumption, general positive and negative effect axioms, the completeness assumption, and a clear explanation of why regression is important (planning and Green etc.). That paper provides a much better reference paper for these points than the paper currently under review.

The first half of the paper fails refereeing criteria 2, in that it does not specify the assumptions, motivations, and notations used in the approach.

The lack of some background is not the only failing of the paper. Perhaps the greatest failing of the paper is to provide something that could be used as a reference. This is most clearly shown by the second part of the paper. This is written in an entirely different style, without formal definitions. The first thing this section does is to throw out the earlier definitions.

They first add two new symbols to the situation calculus. Earlier, much care was made in stating that symbols like this were disallowed. The entire definition of the language of the situation calculus is fashioned to deny the existence of new predicates on situations.

Next, the definitions of section 3, where 4 foundational axioms were given are changed. Only two axioms remain from the 4 foundational axioms, the unique name axioms. The other foundational axioms are changed drastically. (Perhaps this shows that the other foundational axioms should be divided into parts.)

Thus the basic definitions of section 2 and 3 do not serve even until the end of the paper.

The paper also contains a definition of Golog, which is essentially a notational variant of dynamic logic. The claimed difference, procedures, are a well known alternative to using a fixed point operator. The semantics of dynamic logic and Golog are isomorphic. If there is anything else to Golog, as I believe there is, it is not clear from the paper.

Q7. **Area Editor**

Both referees recommend that the article should be accepted, and the area editor follows this recommendation.

Both referees have questions or recommendations on important aspects of the article. However, the present area editor considers many of these to be recommendations for a survey or tutorial article, rather than for a reference article as defined in the call for contributions and in the refereeing criteria. The authors are welcome, but not required to add material in the form of an annex to the present article, and the article is accepted for the ETAI.

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Murray Shanahan:

The Event Calculus Revisited

Abstract of the article

This article presents the event calculus, a logic-based formalism for representing actions and their effects. A circumscriptive solution to the frame problem is deployed which reduces to monotonic predicate completion. Using a number of benchmark examples from the literature, the formalism is shown to apply to a variety of domains, including those featuring actions with indirect effects, actions with non-deterministic effects, concurrent actions, and continuous change.